

Ref. #54 54

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

Project

Date

Author

TITLE

WASATCH EXPERIMENTAL CONTROL PROJECT

by

Archie L. Gibson
Assistant Entomologist

Forest Insect Laboratory
Coeur d'Alene, Idaho
September 3, 1940

SUBJECT--

INDEX NO.--

File No. 543.1

Noted by

7/1/41

RLF

W.B.

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

WASHINGTON, D. C.

Forest Insect Laboratory
Coeur d'Alene, Idaho
December 13, 1940

DEC 14 1940

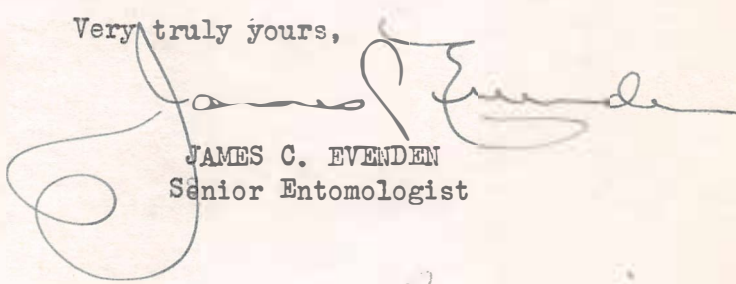
Mr. F. P. Keen
445 U. S. Court House
Portland, Oregon

Dear Mr. Keen:

Enclosed is a copy of Mr. Gibson's report of the Wasatch experimental control project, under date of September 3, 1940. In the back you will notice that there is a supplemental report showing the cost of treatment, which is based upon the best information that we have available. Although the cost per tree is rather high, it is believed that as this method is used improvements in administration will follow and that the cost of treatment can be materially lowered.

We would be glad to answer any questions concerning this report that you may care to ask.

Very truly yours,


JAMES C. EVENDEN
Senior Entomologist

Enclosure

Copy made for Bureau

C O P Y

Forest Insect Laboratory
Coeur d'Alene, Idaho
December 13, 1940

Mr. F. P. Keen
445 U. S. Court House
Portland, Oregon

Dear Mr. Keen:

Enclosed is a copy of Mr. Gibson's report of the Wasatch experimental control project under date of September 3, 1940. In the back you will notice that there is a supplemental report showing the cost of treatment, which is based upon the best information that we have available. Although the cost per tree is rather high, it is believed that as this method is used improvements in administration will follow and that the cost of treatment can be materially lowered.

We would be glad to answer any questions concerning this report that you may care to ask.

Very truly yours,

JAMES C. EVENDEN
Senior Entomologist.

WASATCH EXPERIMENTAL CONTROL PROJECT

INDEX

	Page
Introduction - - - - -	1
Location of project - - - - -	2
Description of area - - - - -	2
Project administration - - - - -	2
Spray formula used - - - - -	3
Methods of treatment - - - - -	3
Technique of treatment - - - - -	4
Statistical summary of project - - - - -	6
Examination of treated trees - - - - -	10
1. Bottom side of treated logs - - - - -	11
2. Logs on ground or in air - - - - -	11
3. Logs lying north and south - - - - -	11
4. Stumps of felled trees and base of trees	
treated standing - - - - -	11
5. Untreated bark surface - - - - -	11
6. Bark thickness, texture, and moisture - - - - -	11
7. Density of brood - - - - -	12
8. Standing and felled trees - - - - -	12
9. Temperature - - - - -	12
10. Arrested brood development or delayed mortality	12
Summary comments	
Spraying of standing trees or felling for	
treatment - - - - -	13
Spraying standing trees - - - - -	15
Spraying felled trees - - - - -	16
Spraying equipment - - - - -	16
Felling equipment - - - - -	16
Personnel - - - - -	17
Preparation of spray formulae - - - - -	17
Stump treatment - - - - -	17
Conclusions - - - - -	18
 SUPPLEMENTARY REPORT (COST OF PROJECT) - - - - -	 26

WASATCH EXPERIMENTAL CONTROL PROJECT

by
A. L. Gibson *
Assistant Entomologist

INTRODUCTION

The Wasatch experimental bark beetle control project was instituted on the 3rd of June and closed on the 28th. Although previous experiments had demonstrated the effectiveness of certain sprays as a means of destroying overwintering broods of the mountain pine beetle in lodgepole pine, the practicability of the treatment as a standard practice was yet to be established. The objective of the Wasatch project, which was made possible through the cooperation of the United States Forest Service, was to test the effectiveness of penetrating sprays under field conditions and to determine the cost of their application.

Labor was employed, and equipment, supplies and materials furnished by the forest supervisor of the Wasatch National Forest. Mr. A. L. Gibson, Assistant Entomologist of the Forest Insect Laboratory at Coeur d'Alene, Idaho, was responsible for the technical phases of the work, with Mr. Lester W. Hanna, of the Wasatch Forest organization, acting as camp manager in charge of administration.

* Mr. Evenden, Senior Entomologist, Forest Insect Laboratory, Coeur d'Alene, Idaho, assisted in the organization of this project during the first week of the operation and has assisted in the preparation of this report.

LOCATION OF PROJECT

The area selected for this experiment is known as the Duchesne unit of the Wasatch National Forest. It lies on the west side of the north fork of the Duchesne River, extending north from Iron Mine Creek and includes parts of sections 8, 9, 16, and 17., R. 9 W., T. 2 N. The northern portion of the infested area is reached by the Soapstone forest-products utility road.

DESCRIPTION OF AREA

This unit is a rough, heavily glaciated plateau (figure 1) varying from 7,000 to 10,000 feet in elevation. On most of the area the soil is quite thin, with numerous patches of bare rock showing glacial scratches and polish (figure 2). Glacial rocks are numerous and ponds and swamps are present in some portions. Rock outcroppings are numerous and high slide rock cliffs separate the area into two rather distinct work units. The forest is a lodgepole pine type with Engelmann spruce, alpine fir, and a few Douglas fir trees in mixture. The area is not heavily stocked except along the creeks and flats, where a denser forest growth occurs in the deeper soil. The lodgepole pine trees are large and tall with extremely thick bark.

PROJECT ADMINISTRATION

Two crews, composed of a foreman, two sawyers, a swamper, two treaters and a packer, were employed in the execution of this project. The area was worked from one camp, which at the time the project was instituted was approximately two and one-half miles by pack trail from the end of truck transportation on the Soapstone utility road.

The spotting-treating method of treatment was employed, with the infested trees being sprayed as located. In this method the crews, in line, move through the woods, with each man covering a strip one chain in width. The outside man marks the outer edge of his strip with paper and on the return trip he becomes the inside man and guide for the remainder of the crew. Spray equipment, felling tools, and spray materials were carried by two pack horses for each crew.

SPRAY FORMULA USED

Orthodichlorobenzene	1 part by volume
Fuel or Diesel oil (Baume gravity 28-32)	4 parts by volume

The two ingredients were transported to the camp and the formula mixed at that point.

METHODS OF TREATMENT

Penetrating sprays were sought in the hopes that they would supplement the fuel oils used with the burning-standing method of control and thus eliminate the danger and expense associated with the use of fire. The difficulty of applying these sprays to standing trees so that the total infested length would be thoroughly treated was fully realized. It was also evident that, as with the burning-standing method of control, there would be trees infested to such a height that they could not be treated from the ground, making it necessary to fell them for subsequent treatment. With these difficulties in mind it was thought that it might be more economical to fell practically all trees for subsequent treatment rather than attempt to treat those standing

that were only infested to a height of 30 feet. To satisfy this question slightly different procedures of treatment were employed by the two crews. One crew used the telescopic spray rod extension and adjustable nozzle developed at the Cedar d'Alene Laboratory, and treated all trees standing that, in the opinion of the crew foreman, could be sprayed to the height of the infestation. Under favorable conditions trees could be treated to a height of 25 to 30 feet. The second crew did not use spray rod extensions or adjustable nozzles, and confined the treatment of standing trees to individuals that were infested to a height of 10 to 15 feet only. In most all cases these were small trees or light, one-sided attacks. All other trees were felled for treatment.

Smith Banner, 4 gallon capacity, compressed air sprayers were used in applying the spray. Each crew was equipped with felling tools, canthooks for rolling logs, axes, etc., which were carried on pack horses. The spray was transported to the woods in 5-gallon syrup cans placed in specially constructed side pack boxes. A maximum load for each pack animal was 20 gallons.

TECHNIQUE OF TREATMENT

As this treatment could only be effective where the spray was properly applied, it was necessary to employ a technique which would accomplish this objective without loss of time or waste of materials. In using penetrating sprays the bark must be thoroughly covered, but care must be exercised to prevent waste. Thick-barked trees require more spray, and it is often necessary to cover the base of large trees with a second spraying. This can be applied a minute or two after the

first coverage has been made. Thorough spraying demands that the entire surface of the infested portion of the bole be sprayed until the bark glistens and drops of moisture appear on the bark scales. There is little lateral distribution of the spray beneath the bark, so if an area of a few square inches of bark is missed or improperly sprayed, the insects beneath are not destroyed.

When standing trees are treated the basal portion is sprayed. The spray tank should be equipped with a 30-inch extension and a fine spray nozzle so as to avoid splashing and to provide for an even coverage. The lower 10 to 15 feet of the tree can be treated with this equipment. In treating the upper portion of the bole the adjustable nozzle and spray extension rod are used, the rod being extended as required. When spraying close to the end of the spray rod, the fan spray from the adjustable nozzle is used, but when a height greater than the limits of the rod is required, the fine solid stream from the nozzle is necessary. Considerable difficulty is experienced in spraying trees to a height of 20 to 30 feet. The spray blows into the face of the operator necessitating the use of goggles, which are a handicap to thorough work. Limbs and adjacent trees interfere with the application of the spray and in obtaining a thorough coverage of the upper bole considerable spray is wasted.

When trees are felled for treatment, the infested portion of the bole is cut off and the limbs removed to facilitate rolling. The treat-er, using a 30-inch extension rod and a fine fan-spray nozzle, walks along the top of the log and sprays the upper arc of the circumference. The width of the strip to be covered governs the distance that the

nozzle is held from the log, which will vary with the size of the log being treated. By spraying the top of the log only, splashing or wasting of spray is avoided, and the force of gravity apparently aids penetration. As each top are is sprayed the log is rolled sufficiently to permit the treatment of another strip. Care must be exercised to prevent the leaving of unsprayed areas of bark between the strips or behind knots or limbs.

STATISTICAL SUMMARY OF PROJECT

It is regretted that the expenditures for transportation, equipment, and material were not available during the preparation of this report. Due to the absence of those data no financial statement concerning the cost of treatment is possible, as the fragmentary information available would probably yield incorrect figures. When these data are made available, a supplemental report will be presented.

General Data

Total number trees treated		1,235
Total number gallons spray used		
Fuel oil	1,600	
Orthodichlorobenzene	400	
	<u>2,000</u>	2,000
Gallons of spray per tree		1.619
Cost of spray per gallon ^{1/}		\$0.27
Cost of spray per tree		0.44

^{1/} This cost, exclusive of transportation, is based upon a rail-head delivery cost of \$0.95 for orthodichlorobenzene and \$0.10 for fuel oil, per gallon.

Crew Production

Total man days	
Effective	230.5
Noneffective	<u>102.5</u>
	333.0
Trees treated per total man day	3.7
Trees treated per effective man day	5.4

Comparison of Production of the Two Crews Using Different Techniques of Treatment

	Crew No. 1 ^{2/}	Crew No. 2 ^{3/}
Total number of trees treated	699	536
Square feet infested bark surface treated per tree	94.2	99.7
Gallons of spray used per tree	1.70	1.51
Cost of spray per tree (transportation from rail head not included)	.44 ⁴⁶ ₁₀₀₀	.41
Number of trees felled	247	284
Average d.b.h.	18.8 inches	18.5 inches
Average length treated	37.4 feet	34.3 feet
Number of trees treated standing	452	252
Average d.b.h.	15.2 inches	14.9 inches
Average height treated	20.2 feet	17.7 feet
Man days expended (effective)	122 ^{4/}	120.5
Total trees treated per effective man day	5.73	4.45

^{2/} Crew No. 1 used telescopic spray rod extensions and treated all trees that could be sprayed to the height of infestation.

^{3/} Crew No. 2 did not use telescopic extensions and treated standing only those trees that were infested to a short length or one-sided attacks.

^{4/} Includes 12 man days of training and contributed time.

The preceding production data are offered for what they may be worth, although perhaps they can be subjected to some question. This question would arise from the rather rough technique employed in obtaining such measurements as d.b.h., height treated of standing trees, and our computation of infested bark surface treated. However, it is believed that they do depict a comparison of the production from the two crews.

The production per effective man-day for the entire project seems rather low, as one would assume that more than 5.4 trees should be treated. However, these trees were exceptionally large, which of course involved more labor than would be necessary in a stand of smaller trees. It is possible that in using this method of control some improvements can be made in project administration so as to increase this production. Perhaps in areas of heavy infestation it would be advisable to have one or two men spotting ahead of the treating crews. This would eliminate time lost in the packing of equipment onto the pack stock and its subsequent removal when additional infested trees are located. It is believed that when heavy infestations are encountered the area could be blocked with string lines or other marks and that one or two men at the most could spot ahead of a treating crew.

In analyzing the output of the two crews, it is obvious that crew No. 1 using the telescopic spray rod extensions should and did treat more trees than crew No. 2. However, crew No. 1 was also obliged to fell a large number of trees which could not be treated to the height of infestation. In fact, there was but little difference in the

actual number of trees felled by the two crews. Crew No. 1 felled 247 and crew No. 2, 284. On this basis it would seem that the production of the two crews should have been much closer together, for crew No. 1 treated 699 trees, while crew No. 2 only treated 536. The explanation of this difference is that crew No. 1 was working in a much heavier infestation than crew No. 2. This condition eliminated time lost in spotting of infested trees, while crew No. 1 working in a lighter infestation spent a large portion of their time in this manner. It is believed that had the two crews been working under comparable conditions their production would have been more closely balanced.

It will also be seen that the average diameter and the average length treated of trees treated by crew No. 1 is greater than those treated by crew No. 2. This is contrary to what we had expected, for it was believed that crew No. 2, charged with the felling of all trees that were infested to a height of more than 10 or 15 feet, would have shown a greater average length treated. However, this can be explained by the fact that the two crews felled nearly the same number of trees and that the larger diameter of the trees treated by crew No. 1 undoubtedly resulted in a greater infested length.

There was a difference in the volume of spray used, which amounts to .2 of a gallon and which under the prices paid for the materials shows a saving of 5.4 cents per tree. This is not a formidable figure; however, when transportation, time spent in mixing, etc., are computed, it may be a more important item than would appear at this time.

EXAMINATION OF TREATED TREES

Prior to the institution of this project no fears were held as to the effectiveness of the penetrating spray. However, the large, thick-barked, heavily infested trees presented a more formidable problem than the smaller trees on which past experiments had been conducted. This condition caused some anxiety as to the results that would be obtained. As a check upon this phase of the project 10 percent of the treated trees were examined on July 13, 14 and 15 by Messrs. Evenden and Gibson.

The results of this examination were satisfactory, as the data obtained show that there was a partial survival of the insects under 3 percent of the treated bark. This survival occurred only in areas of green or wet bark in the base of trees treated standing and in the stumps of felled trees, as well as under bark on all portions of the bole that had been missed or improperly treated. As it was possible that some further mortality might occur among these living insects, 26 trees treated standing and 22 stumps were examined by Mr. Gibson on August 8. Although it is possible that some additional mortality may have occurred between the two examinations, there were still some living insects to be found that were apparently normal. However this condition was not overly serious, as the average brood mortality for the stumps alone could be safely set at 95 percent, with an average mortality for the entire tree of 98 percent.

The following notes relative to brood mortality were taken at the time of the July 13-15 examination:

1. Bottom side of treated logs

Although brood mortality on the bottom side of the log seemed to have been delayed somewhat from that on the upper surface, it was nevertheless as complete. This was also true of logs with the under side rather heavily embedded in the soil.

2. Logs on ground or in air

There was no apparent difference in brood mortality between logs lying flat on the ground and those supported by logs or rocks. It is possible that mortality had been a bit more rapid in logs held above the ground, but this is questionable.

3. Logs lying north and south

No difference was recorded in brood mortality in trees felled north and south and those felled east and west. Under borderline conditions it would seem that best results would be obtained in logs lying north and south, which would expose both sides to the sun.

4. Stumps of felled trees and base of trees treated standing

Living insects were found in nearly all stumps and in the base of all trees treated standing, where green bark occurred at the bottom of the attacked area. Felling the trees seemed to cause some drying out of the stump, as more living insects were found in the base of trees treated standing than in the stumps of those felled for treatment.

5. Untreated bark surface

Untreated or lightly treated bark surface could be quite easily distinguished, as it was of a much lighter color than properly treated bark surface. Living insects were always found under such bark surface, regardless of its size.

6. Bark thickness, texture, and moisture

Although bark thickness is a factor influencing subsequent brood mortality, it was evident that the handicap of the thick bark on many of the trees treated had been overcome through the application of extra spray on the basal portion of the log. The area covered by this extra heavy treatment was quite noticeable on some logs, as evidenced by the difference in time of mortality between the two areas.

Bark texture is an important factor, as the hard, flint-like bark, which is often broken into small squares, seems to offer more resistance to the spray. Although somewhat slower, complete brood mortality was ultimately obtained, which eliminates this factor as being of any great importance. The same conditions existed in areas of excess bark moisture, with a slower but complete mortality occurring.

7. Density of brood

Although no difference in brood mortality occurred to support this contention, it was apparent that a more rapid mortality had occurred in heavily infested trees. This would be as expected, due to more rapid drying of heavily infested trees.

8. Standing and felled trees

Obviously the felled trees would dry more rapidly than those treated standing. This condition was directly reflected in the speed and degree of brood mortality. It was apparent that quicker and better mortality was obtained in the basal portion of trees felled for treatment than in the same position of trees treated standing.

9. Temperature

Temperature is undoubtedly an important factor governing the speed and time of mortality following treatment. Trees treated during the first week of this project, at which time fairly low temperatures prevailed, did not show a satisfactory mortality by the last of June. However, this condition was subsequently overcome, as at the time of the July examination conditions were satisfactory. It would seem that regardless of weather condition at the time of treatment, sufficient warm weather will occur prior to the emergence of the beetles to insure the desired mortality. The advantages of severe warm weather at the time of treatment may be somewhat offset by evaporation of the applied spray.

10. Arrested brood development or delayed mortality

It is quite obvious that there is a delayed mortality which depends upon some or all of the factors mentioned. It is also quite evident that in many instances the spray causes an injury to the larvae, which although not fatal at the time, arrests further development, with inevitable death. In many instances it would seem that brood development had progressed until environmental conditions were right for the spray to become effective, at which time a 100 percent mortality occurred.

SUMMARY COMMENTS

The following comments are based upon data obtained during the course of the project and from the subsequent examination during July. They are submitted in the hopes of being of some service in planning future projects.

The treatment of bark beetle infested lodgepole pine trees with penetrating sprays is not a "fool proof" method of control. A let-down from an accepted character of work means a reduction in subsequent brood mortality. To eliminate this objection, supervision must be adequate and constant. As has been previously mentioned, there will be no brood mortality under bark surface that is missed or improperly treated, so it is imperative that crew foremen be present at the treating of as many trees as possible. It is suggested that crew foremen be equipped with a marking axe or provided with some means of marking the stumps or the base of all trees where in their opinion the treatment is considered satisfactory. This procedure would have the two-fold purpose of fixing responsibility for improper treatment as well as creating a desire on the part of the foreman to see as many trees treated as possible.

Spraying of Standing Trees or Felling for Treatment

Concerning the advantages of these two methods of treatment the following advantages and disadvantages of each method are listed.

Felling for Treatment

Advantages

1. More thorough treatment.

Standing Treatment

1. Only one man required.

2. Less spray material used - 1.5 gallons per tree.
3. No inconvenience to treater from blowing spray.
4. No extension rods necessary.
5. Greater brood mortality.
6. More uniform mortality.

2. Trees do not have to be felled or limbed.
3. Larger output per crew per day.
4. Less cost per tree.

Disadvantages

1. Time lost in felling, limbing and rolling log.

1. Wasting oil.
2. More time required to spray tree.
3. Can not treat through limbs and especially witches broom.
4. Spray blows in operator's face.
5. Can not obtain proper coverage, even on portion of trunk sprayed.
6. Can not tell height of infestation.
7. Bark and sapwood retains more moisture than in felled trees.

To check the results obtained through the treatment of standing trees, ten trees were felled and thoroughly examined. These trees were not considered as a fair sample of the standing treatment, as only questionable individuals were selected for this test. It was estimated that the ten trees selected represented 9 or 10 percent of the total number of the trees treated standing. The data from the examination of these trees follow:

7 trees were not sprayed to height infested.
Average length of unsprayed portion 9.6 feet.
Only 70 percent of infested length treated.

2 trees were sprayed higher than the attack.
Average excess length sprayed 6.5 feet.

1 tree was sprayed to the correct height.

These data demonstrate the difficulty of estimating the height of infestation, which is almost if not quite impossible. In treating standing trees, where it is desired to treat all infested bark surface, the only safe rule to follow is to treat up to a 6- or 8-inch top diameter. In following this rule a variable amount of uninfested bark surface will obviously be treated, but little if any brood will be missed.

1. Spraying Standing Trees

In spraying standing trees care must be exercised to obtain a thorough coverage. The base must be given some additional spray to compensate for thick, moist bark. It is best to thoroughly soak this portion of the tree two or three times, for if an attempt is made to apply a heavy dosage of spray at one time, most of the extra material will run off. Standing trees can only be treated until the spray begins to form in drops on the bark flakes and additional spray applied at that time will result in a waste of material. However, the spray is absorbed quite rapidly and in a few seconds an additional coverage can be made.

2. Spraying Felled Trees

In treating felled trees the infested length must be cut off and the limbs removed so that the log can be turned. Spraying is confined to the upper or top side, with the log being turned so as to expose additional untreated surface. By confining the spraying to the top of the log there is no loss of spray material, as all surplus liquid runs down the sides and is absorbed by the dry bark. When the sides of a log are sprayed there is a marked wastage of spray due to splashing and dripping.

A factor contributing to proper treatment is the treaters' footwear. These men should be equipped with calked shoes so that they can walk along the top of the log with safety. Adequate training should be given to the men who are to act as treaters.

3. Spraying Equipment

The spray tanks, extensions, and adjustable nozzles all proved satisfactory for this work. For treating logs, a nozzle should be obtained or developed that will throw a fine fan-like spray. Nozzles from Indian Fire Pumps were used for this purpose during the project. These nozzles were not entirely satisfactory, as the large aperture required the operator to work rapidly along the log. A finer spray would permit a slower pace and more attention could be given to covering areas behind limbs, as well as to lapping of strip, etc.

4. Felling Equipment

Good saws and axes should be made available, as the output of woodmen can be measured by the quality of their tools. Saws must be

kept in good repair, and sawyers should be employed who are capable of filing their own saws, or else a saw filer for the camp must be made available. The wages of this man will be recovered by an increased production.

5. Personnel

On the Wasatch project a fine group of conscientious men were employed, which was reflected in the work performed. In employing men for projects of this character, consideration should be given to the different tasks, and men hired for specific jobs. In a well-balanced, trained crew, the daily output is dependent upon each man doing his task in an efficient manner. Time spent in training foremen and treaters will be reflected in the character of the work performed throughout the operation and no project should start until such men have been adequately trained. Treaters should thoroughly understand the technique to be followed so that there will be no occasion to depart from it.

6. Preparation of Spray Formulae

The mixing of the ingredients comprising the spray formulae to be used should be done at some point, possibly at the rail head, prior to being transported to the woods. It must be borne in mind that this is an important task, and the responsibility should not be passed to one who is not dependable. It is easy to confuse proportions, and mistakes which would obviously jeopardize the success of the project can only be avoided by a constant checking of measurements.

7. Stump Treatment

The only weakness in this method of treatment, as revealed by this project, is the failure of the spray to destroy insects adjacent

to areas of green bark in stumps of felled trees and the bases of trees treated standing. This is not a serious objection, as it is estimated that this survival amounted to less than 1 percent of the total brood treated. However, it is believed that this objection can be overcome and the following suggestions have been made which may contribute towards an answer:

1. Hack girdle the root collar prior to spraying.
2. Notch girdle the root collar prior to spraying.
3. Hack the stump so as to increase drying and aid penetration.
4. Cut low stumps and peel.

These and perhaps other suggestions should be tested during subsequent projects.

CONCLUSIONS

This project has shown that during the 1940 season penetrating sprays were applied economically and effectively in controlling the Black Hills beetle in lodgepole pine. Although it is recommended that this method of control be employed wherever it can be used to advantage, the results of subsequent projects during the next few years should be carefully checked, as it is possible that contrary weather conditions or a difference in the toxic properties of the chemicals used might influence results.

As to the two slightly different techniques of treatment employed on this project, it would seem that when all factors are considered the one used by crew No. 2, in which only those trees with an obviously short infected length were treated standing, will prove the most economical and efficient for infestations of this character. It is

recognized that a different type of infestation would perhaps reverse this decision, as small-diameter trees with short infested lengths could be treated standing more economically. It would therefore seem that a decision as to the procedure to be followed will need be made for each situation.

The cooperation of the Forest Service in making this experimental project possible is greatly appreciated, as it is from such tests only that the actual effectiveness and efficiency of new methods of bark beetle control can be established.

Respectfully submitted,

ARCHIE L. GIBSON
Assistant Entomologist

APPROVED:

JAMES C. EVENDEN
Senior Entomologist



Figure 1. North portion of area from rock cliff which separates the unit.



Figure 2. Glacial scratches on rocks



Swamper chopping limbs from infested tree, followed by treater.

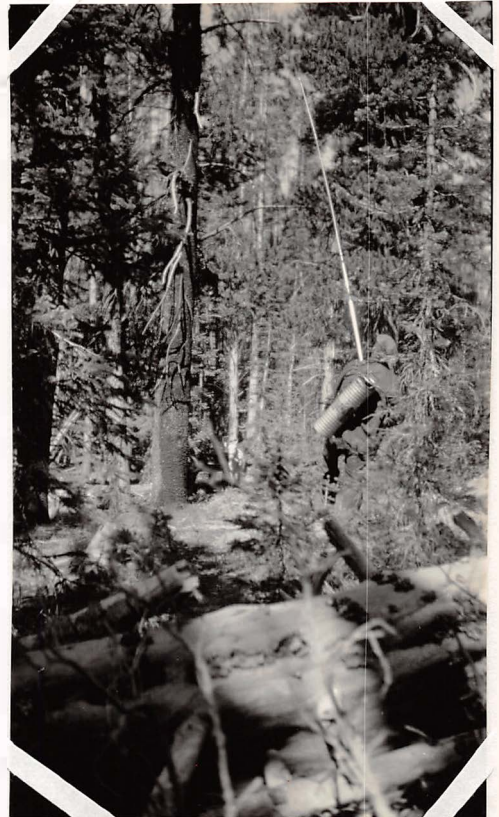


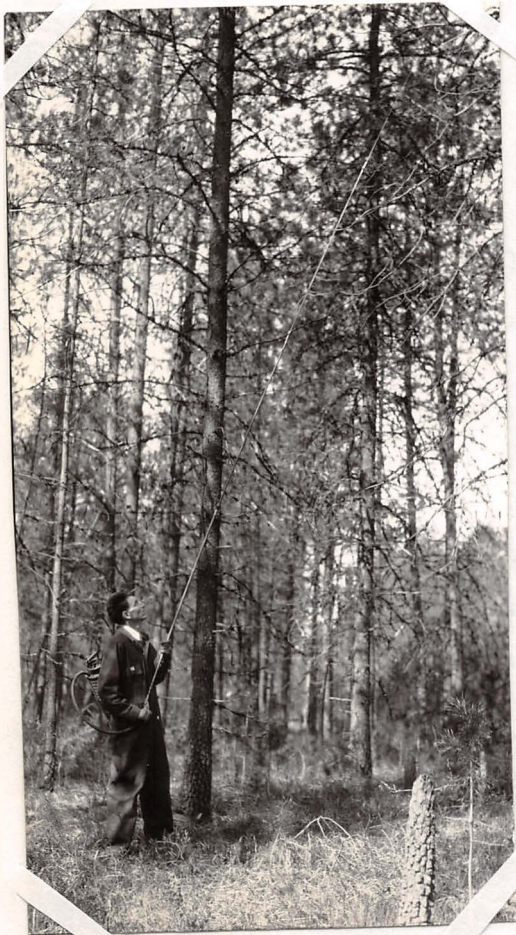
One of the large, thick-barked infested lodgepole pine felled for treating.



Treating a felled tree. The fan-shaped spray is secured from an Indian fire-pump nozzle.

Spraying a tree standing by using a telescopic extension.





Another view of the telescopic extension rod used in spraying the upper part of the infested tree.

The extension rod telescoped to facilitate transport and the spray tank.

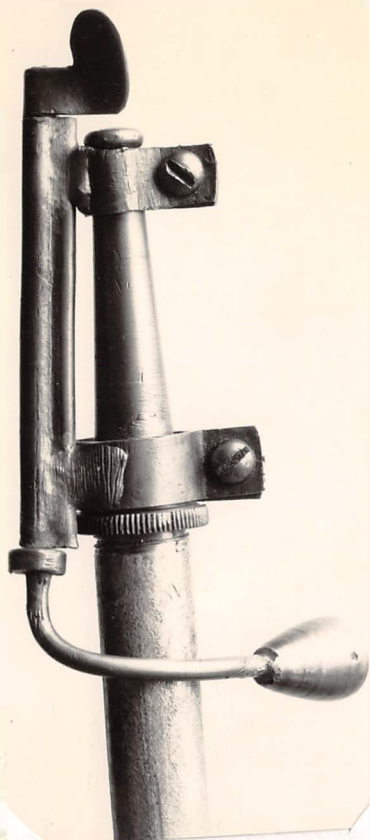




Pack string furnished with each crew. Note boxes for holding two five-gallon cans of spray.



Part of the pack string which supplied the camp. The oil drums are empties being returned to the end of the road.



Nozzle on telescopic extension set to break spray into fine spray by striking against baffle plate.



Nozzle on telescopic extension flipped over to allow solid spray stream for treating upper part of infested portion of tree.

Forest Insect Laboratory
Coeur d'Alene, Idaho
December 12, 1940

SUPPLEMENTARY REPORT OF THE WASATCH
EXPERIMENTAL CONTROL PROJECT
1940

by
Archie L. Gibson
Assistant Entomologist

INTRODUCTION

On September 3 a report of the broader phases of the control project using penetrating oils on the Black Hills beetle infesting lodgepole pine on the Wasatch National Forest in 1940 was submitted to the agencies concerned. For their benefit a cost analysis and a few details on some phases of the project are given in the following pages.

ANALYSIS OF COST

<u>Item</u>	<u>Amount</u>	<u>Cost per tree</u>	<u>% of total cost per tree</u>
Salaries	\$1,400	\$1.133	41.9
Subsistence supplies	440	.356	13.1
Equipment purchases, repairs and transportation of equipment	400	.324	12.0
Orthodichlorobenzene	358	.290	10.7
Fuel oil	155	.126	4.6
Horse hire	266	.215	7.9
Horse feed	106	.086	3.2
Forest officers travel and contributed time	117	.095	3.5
Transportation	25	.020	..7
Miscellaneous	<u>82</u>	<u>.066</u>	2.4
	\$3,349	\$2.710	

Trees treated -- 1,235
Spray used --- 2,000 gallons

Cost per treated tree seems quite high. However, the average infested lodgepole pine is much smaller than those treated on the Iron Mine Creek project and for that reason the latter would show considerably higher than average treating cost.

PROJECT ADMINISTRATION

Spilling of the oil on pack stock must be prevented due to the irritation caused by it when in contact with the skin and the more serious burns and irritation which occur if it soaks through saddle blankets. From previous tests and experience on this project, the use of oilcloth aprons under the pack saddle and over the saddle blankets has proved an excellent safeguard, but to be effective they must be in good condition and extend far enough down the side to prevent any oil dripping on the animal.

EQUIPMENT

In the original report, the 5-gallon cans used for transporting the oil were incorrectly called syrup cans. The cans used were not syrup but honey cans, which differ considerably in construction and are of much heavier metal.